

Talar Fracture Repair and Rehabilitation

Surgical Indications and Considerations

Anatomical Considerations: The talus is made up of a body (consisting of a dome, central portion, a lateral process, and a posterior process. Along with that is the talar neck and head. There are no tendons attached to the talus, it is held by ligamentous as well as bony structures. It articulates with the tibia, medial and lateral malleoli, calcaneus, and the navicular bone. The talus has a rich vascular network made up of three main arteries, the posterior tibial artery, anterior tibial artery, and peroneal artery.

Pathogenesis: Decreased osteoblast activity in the bone makes it become weak to stresses placed on it. Strong axial and shear forces accompanied with activity or trauma can cause bones in the body to break. Therefore talar fractures usually occur with a severe impact like trauma to an either dorsiflexed foot or with an increased load on a hyper-plantar flexed foot. Examples range from involvement in a motor vehicle accident to forces produced by ballerinas while dancing.

Epidemiology: Talar fractures are quite rare, they account for about 0.14% - 0.32% for all fractures throughout the body. Of all foot fractures talar fractures make up about 3-5%, but they can be underreported. Roughly about 50% of the fractures of the talus involve the talar neck. Fractures of the main portion of the talar body and of the talar head are uncommon. Fractures of the talar dome, lateral process, and posterior process occur primarily in young athletes. But other talar fractures can occur at any age, primarily from a motor vehicle accident or a fall from a height.

Diagnosis:

- Chronic ankle pain and non-union can be present after an undetected fracture that is misdiagnosed as a “chronic ankle sprain”.
- Patient may complain of chronic hindfoot pain.
- Possible tear of lateral collateral ligament or injury to flexor hallucis longus.
- Plain radiographs of the foot and ankle are use to diagnose a talar fracture.
- A CT Scan is used to evaluate displacement of the bone and plan for surgery.
- MRI and CT are used to diagnose clinically occult fractures.

Hawkins Classification of Talar Neck Fractures		
	Radiographic findings	Risk of AVN*
Type I	Nondisplaced fracture line	0-13%
Type II	Displaced fracture, plus subluxation or dislocation of subtalar joint	20-50%
Type III	Displaced fracture, dislocation subtalar AND tibiotalar joints	69-100%
Type IV	Displaced fracture and disruption of talonavicular joint	high

*AVN=Avascular necrosis

Nonoperative vs. Operative Management: There is a general consensus that dislocated talar fractures should be operated on. The collapse rate of the talus has been shown to be lowered due to surgical intervention. Surgical repair allows better healing and decreases the chance of any further complications such as avascular necrosis or severe arthrosis of the ankle. Immediate reduction of fracture dislocations is essential to preserve blood supply to the talus and to also avoid secondary soft tissue edema. Unlike non-operative treatment it also permits early mobilization of the joint. Indications for non-operative treatment are used solely for undisplaced talar fractures. If stable fixation with surgical treatment is not used than prolonged immobilization of the ankle is used. A non-weight bearing status is usually preferred. Due to the long term immobilization of the ankle significant problems can arise such as secondary arthrosis, muscle atrophy, and cartilage atrophy (with 2/3 of the bone surface being covered by cartilage).

Surgical Procedure: According to both Kundel and Frawley et al careful closed fracture reduction should be attempted as early as possible during assessment in the emergency room. Most of the blood supply runs along the neck of the talus, with the neck being the most common fracture site. Immediate reduction of fracture dislocations is vital to maintain blood supply to the talus and therefore the antero-medial approach is usually preferred. The approach goes from the navicular to the medial malleolus between the tibialis anterior and the tibialis posterior tendons. K-wire transfixation of a mobile fragment can be used to maintain the reduction during the insertion of usually 2 titanium screws. Open reduction along with stable internal fixation of a talar fracture can speed along recovery. Earlier motion is then achieved leading to increased weight bearing status as well as preservation of the blood supply to help with healing and post-operative rehabilitation.

Preoperative Rehabilitation:

- Immobilization of ankle with temporary splint or cast before surgery is performed in the emergency room.
- Instruction in assistive device for ambulation while maintaining a non-weight bearing status.
- Instruction and review of post-operative rehabilitation.

POSTOPERATIVE REHABILITATION

Phase I for Early Motion and Rehabilitation: Week 1-6

Goals: Initiate early active motion

Control edema and pain

Maintain motion of affected/unaffected joints in the foot

Intervention:

- Surgical scar protection
- Mobilization to ankle/foot to increase joint mobility
- Elevation with intermittent ice compression
- Active ROM exercises (i.e. ankle pumps) to increase circulation to the foot and promote cartilage healing
- PROM to joints of the ankle/foot (increase ROM, control pain, once edema is lowered)
- Instruction in non-weight bearing crutch ambulation

Phase II for Early Motion and Rehabilitation: Weeks 6-8

Goals: Partial weight bearing

Prevention of necrosis of the talus

Continue with joint mobilization in Phase I as needed

Increase AROM to 50-75% of normal

Intervention:

- Initiate instruction in partial weight bearing restriction with crutch ambulation.
- Patient performing PROM exercises actively to ankle.
- Aquatic therapy – ambulation in waist to chest high water (partial wt. bearing).
- Instruction in donning and doffing walking boot.
- Pain free open chain exercises with band.
- Stationary bike to pain free tolerance without walking boot.

Phase III for Early Motion and Rehabilitation: Weeks 12-24

Goals: Full weight bearing at 12 weeks
Normal ankle/foot ROM
Normal gait mechanics without walking boot

Intervention:

- Initiation of gait training in parallel bars
- Progressive resistive strengthening of ankle musculature with band
- Proprioceptive weight bearing activities for balance
- Gait training on treadmill with progression to incline surface
- Single leg support activities
- Fast walking with progression to jogging for patient specific activities

Selected References:

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